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AUTHOR Spahr, Anthony E.
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ABSTRACT

A study was undertaken at Morton College, in Illinois, to examine the relationship of entering grade point average (GPA) and grades in prerequisite support courses in algebra, biology, and chemistry to graduation in the college's nursing program. A sample was developed of 255 students admitted to the nursing program in 1990, 1991, and 1992 and regression equations were calculated to determine the relationships between these predictor variables and graduation status after 2 years. Means and standard deviations were determined, and an additional follow-up logistic regression was performed to estimate a student's odds of graduating from the nursing program based solely on GPA. Results indicated that the best predictor of graduation status was entering GPA, followed by grades in biology and grades in chemistry. Although all of these correlations were significant, the amount of variance in graduation status explained by each was very small. Moreover, when entering GPA was included in the analysis, the independent contributions made by course grades were inconsequential. However, using GPA as the sole predictor indicated that a student with a low entering GPA was almost as likely to graduate from the program within 2 years as a student with a high GPA. This indicates that other variables besides entering GPA should be examined, such as reading skill level, computational skill level, and vocational interest tests. (KP)

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Predicting Graduation Status of Nursing Students Using Entering GPA and Grades in Algebra, Biology, and Chemistry

Anthony E. Spahr, Ph.D.
Vice President of Human Resources and Research

Introduction

Information evaluated to determine who is admitted to the Nursing Program includes a student's grade point average (GPA) at the time of application and grades in the prerequisite support courses of algebra, biology, and chemistry. The rationale for using these criteria is that they are related to success in the Nursing Program and can be used to predict who will and will not graduate. The assumption is that students with a high entering GPA and high grades in algebra, biology, and chemistry are more likely to graduate than those with a low entering GPA and low grades in the prerequisite support courses. Despite its compelling logic, the validity of this assumption has not been tested.

The purpose of the present study was to examine the relationship between entering GPA, grades in algebra, biology, and chemistry, and Nursing Program graduation status.

Method

The sample consisted of 255 students admitted to the Nursing Program in 1990, 1991, and 1992. Entering GPA, grades in algebra, biology, and chemistry, and graduation status within two years of entrance (dummy coded: graduated = 1, did not graduate = 0) were recorded for each of these subjects.

Statistical Analyses

Pearson product-moment correlations and regression equations were calculated to determine the relationships between the several predictor variables and graduation status. Means and standard deviations and the percentage of subjects who graduated from the Nursing Program also were determined. Finally, a follow-up logistic regression was performed to estimate a student's odds of graduating from the Nursing Program based on entering GPA. Logistic regression is an appropriate statistical tool to use when two outcomes are possible.

Results

Table 1 shows the Pearson Product-Moment correlations between entering GPA, grades in algebra, biology, and chemistry, and graduation status. It suggests that the best zero-order predictor of graduation status was entering GPA ($r = .291$), followed by grades in biology ($r = .221$) and chemistry ($r = .190$). Although all of these correlations were significant ($p < .01$), the amount of variance in graduation status

explained by each is relatively small. Of course, these correlations were attenuated because GPA and grades in biology and chemistry were criteria considered in admitting students to the Nursing Program. Moderate size correlations were observed between entering GPA and biology grade (r = .464) and between entering GPA and chemistry grade (r = .409).

Table 1

Correlations Between Entering GPA, Grades in Algebra, Biology, and Chemistry, and Nursing Program Graduation Status

	Entering GPA	Algebra	Biology	Chemistry	Graduation Status
Entering GPA	1.00				
Algebra	.169	1.00			
Biology	.464	.276	1.00		
Chemistry	.409	.098	.276	1.00	
Graduation Status	.291	.087	.221	.190	1.00

Table 2 summarizes the means and standard deviations for entering GPA and grades in algebra, biology, and chemistry.

Fifty-two percent of the subjects graduated from the Nursing Program within two years of their entrance.

Table 2

Mean and Standard Deviation: Entering GPA and Grades in Algebra, Biology, and Chemistry

Variable	Mean	Standard Deviation
Entering GPA	2.737	.487
Algebra Grade	2.463	.859
Biology Grade	2.529	.841
Chemistry Grade	2.573	.861

A multiple regression analysis indicated a significant relationship between the predictor variables entering GPA and grades in algebra, biology, and chemistry and the criterion variable graduation status ($R = .315$, $F = 6.907$, $df = 4/250$, $p = .0001$). However, Table 3 suggests that the independent contributions made by grades in algebra, biology, and chemistry were inconsequential when entering GPA was in the model. Indeed, the amount of variance explained by these predictors was only .004 (R-Squared of full model = .085 and R-Squared of partial model with entering GPA as the only predictor = .081).

Table 3

Beta Coefficients: Algebra Grade, Biology Grade, Chemistry Grade, and Entering GPA

Variable	Coefficient	Standard Error	Standard Coefficient	t-Value	Probability
INTERCEPT	-.367				
Algebra Grade	.015	.036	.025	.411	.6816
Biology Grade	.058	.041	.097	1.414	.1586
Chemistry Grade	.043	.038	.075	1.129	.2599
Entering GPA	.217	.074	.212	2.938	.0036

The results of a logistic regression analysis using entering GPA as the sole predictor of graduation status were disappointing. The odds for a student with an entering GPA of 4.00 (the highest entering GPA recorded) graduating from the Nursing Program within two years were 2.45 to 1.00. The corresponding odds for a student with an entering GPA of 1.56 (the lowest entering GPA recorded) were 1.17 to 1.00.

Conclusion

The purpose of this study was to test the validity of the assumption that entering GPA and grades in the prerequisite support courses of algebra, biology, and chemistry are related to success in the Nursing Program as measured by graduation from the program within two years of entrance. The results of the study provided limited evidence that this assumption is valid. Although the correlations between entering GPA and graduation status, biology grade and graduation status, and chemistry grade and graduation status were all significant, the amount of variance in graduation status explained by each was very small. In a model containing all four predictor variables, entering GPA was clearly the most important. Indeed, once entering GPA was considered, the results of this study suggest that information about a student's performance in algebra, biology, and chemistry was redundant.

A review of the data reveals that a student with a low entering GPA was almost as likely to graduate from the Nursing Program within two years as a student with a high entering GPA. In fact, based on the logistic regression analysis, only entering GPAs of

less than 1.00 predicted that students would not graduate from the Nursing Program within two years. Of course, no students with a GPA this low were admitted to the Nursing Program. By itself, entering GPA explained about eight percent of the variance in graduation status. This means that variables other than entering GPA need to be examined. Variables found to be related to graduation and other indicators of success should be used as criteria for admission to the Nursing Program. Reading skill level, computational skill level, and vocational interest test results are some of the factors which may need to considered.

Although not a major focus of this study, a 52 percent graduation rate within two years of entrance into the Nursing Program should be examined further. Is this an acceptable rate? If not, what can be done to improve it? Also, what happened to the students who did not graduate from the Nursing Program within two years? Did they eventually graduate? Did they enroll in another program at the college, transfer to another institution, or discontinue their post-secondary education? These and other questions are topics for future studies.